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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/079,389

02/20/2002

Reginald R. Bowley JR.

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(15015)

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7590

11/17/2003

Steven Fischman, Esq.
Scully, Scott, Murphy & Presser
400 Garden City Plaza
Garden City, NY 11530

EXAMINER

WACHSMAN, HAL D

ART UNIT

PAPER NUMBER

2857

DATE MAILED: 11/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.



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Commissioner for Patents

Hal D Wachsman
Primary Examiner
Art Unit: 2857

Office Action Summary

Application No.

10/079,389

Applicant(s)

BOWLEY ET AL.

Examiner

Hal D Wachsman

Art Unit

2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 16-21 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 22, 23 and 29 is/are rejected.
- 7) ☒ Claim(s) 5-15, 24-28 and 30-32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: _____

1. Applicant's election without traverse of species I (claims 1-15 and 22-32) in Paper No. 4 is acknowledged.
2. Claims 16-21 and 33 stand withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 4. The Examiner notes the Applicant's statement in the Remarks section of the election that "Applicants hereby reserve their right to have the other species set forth in Claims 16-21 and 33 considered in the present application, upon allowance of the presently elected species." However, the Examiner respectfully notes that in the Restriction requirement mailed 8-30-03, no claim was deemed generic and the Applicant's election of species was made **without traverse**, thus it is not clear what Applicant believes is the basis for having the right to the other species as stated above by the Applicant.
3. The drawings are objected to by the Draftsperson's for the reasons stated on the attached PTO-948 form. The Examiner also objects to the drawings because what is shown in Figure 1 was known in the prior art (see Background of the Invention section in the specification) but was not labeled as "Prior Art". In addition, the Brief Description of the Drawings should be amended to clearly indicate that Figure 1 is prior art. Appropriate correction is required.
4. The listing of references in the specification (see page 3 of the specification, U.S. patent no. 5,656,182) is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be

incorporated into the specification but must be submitted in a separate paper."

Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

5. The Examiner respectfully notes a grammatical error on page 13, line 26 of the specification: "*he* present invention"

6. On the IDS filed 2-20-02, JP 11-186132 was not considered because a complete Abstract was not provided (the Abstract only had "PROBLEM TO BE SOLVED.....due to elements further micromachined and" however there was not a another page following this with the rest of the Abstract).

7. Claims 1-15 and 22-32 are objected to under 37 C.F.R. 1.75(a) for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Claim 1, step b, cites "said feature measurements" however the antecedent basis is "measurements of three dimensional feature changes". This same type of problem also occurs in claim 2, line 4, claim 22, step b, claim 23, lines 3 and 4, claim 29, step c. Claim 3 indicates that the measurements are stored but exactly in what are the measurements being stored ? Claim 6, line 2, cites "computing a derived an equation" which it appears should be "computing a derived equation". Claim 7, line 3, cites "said feature" which lacks clear antecedent basis. Claim 9, line 2, cites "said three dimensional measurements" however the antecedent basis is "measurements of a specific three dimensional feature type". A period is missing at the end of claim 9. This same type of problem also occurs in claim 11, line 3. In claim 15, "A" and "B" need to be defined. Claim 24, line 3, cites "said edge width versus focus data" which it appears

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should be "said edge width versus focus data points". Claim 28 has parts a), b) and c), which it appears should be d), e) and f) as there is already the lettering a), b) and c) in claim 22. Claim 29 comprises a computer usable medium having computer readable program code embodied therein however it is not clear how the functionality of the program code is being realized if it is not being executed such as on a general purpose computer for example. Claim 30, lines 1-2, cite "fifth computer program code" which should be "fifth computer readable program code". This same type of problem also occurs in claim 31, lines 1-2. In claim 32, "x" and "y", needs to be defined. The examiner asks the applicant to better claim the limitations cited above. While the examiner understands the intentions of the applicant he feels confusion could be drawn from the limitations cited above. Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-4, 22, 23 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Ausschnitt et al. (5,976,740).

As per claim 1, Ausschnitt et al. (Abstract, col. 4 lines 4-6, col. 5 lines 54-56, col. 14 lines 19-23) disclose "making measurements of three dimensional feature

changes in a photosensitive resist". Ausschnitt et al. (Abstract, col. 4 lines 21-41) disclose "generating a function which defines....and said focus of said photolithographic exposure tool". Ausschnitt et al. (Abstract, col. 5 lines 23-28, 57-63, col. 6 lines 25-39, col. 16 lines 36-53, col. 17 lines 36-47) disclose "computing from said function a best profile focus value....for controlling the focus errors of said photolithographic exposure tool".

As per claim 2, Ausschnitt et al. (col. 17 lines 1-8, 39-43, col. 26 lines 5-8, 46, 47, 55-58) disclose the feature of this claim.

As per claim 3, Ausschnitt et al. (Abstract, figures 9-16, 20, 21) disclose the feature of this claim.

As per claim 4, Ausschnitt et al. (figures 9-16, col. 26 lines 45-67) disclose the feature of this claim.

As per claim 22, Ausschnitt et al. (Abstract, col. 4 lines 4-6, col. 5 lines 54-56, col. 14 lines 19-23) disclose "means for measuring three dimensional feature changes in a photosensitive resist". Ausschnitt et al. (Abstract, col. 4 lines 21-41) disclose "function generation means for defining a relationship between said feature measurements and said focus of said photolithographic exposure tool". Ausschnitt et al. (Abstract, col. 5 lines 23-28, 57-63, col. 6 lines 25-39, col. 16 lines 36-53, col. 17 lines 36-47) disclose "means for determining from said function a best profile focus value....to control the focus errors of said photolithographic exposure tool".

As per claim 23, Ausschnitt et al. (col. 17 lines 1-8, 39-43, col. 26 lines 5-8, 46, 47, 55-58) disclose the feature of this claim.

As per claim 29, all the features of this claim have already been addressed in claim 1 above with the exception of the method of the invention being embodied in a computer usable medium having computer readable program code to be used on a computer. While Ausschnitt et al. does not explicitly state this feature, figures 19-21 clearly show flow charts (i.e. flow charts of a program) and col. 1, lines 27-30, of Ausschnitt et al. disclose the collection and analysis of critical dimension measurements using SEM metrology and it is inherent in the art that scanning electron microscopes (SEMs) are automated tools with software programming.

10. Claims 5-15, 24-28 and 30-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and subject to the appropriate correction of the 37 C.F.R. 1.75(a) objections noted above.

Claims 5-15 would be allowable over the prior art if rewritten as described above because the prior art does not disclose or suggest retaining a plurality of edge width vs. focus data points, which are from measurements of three dimensional feature changes in a photosensitive resist, for a default exposure level.

Claims 24-28 would be allowable over the prior art if rewritten as described above because the prior art does not disclose or suggest a function generation means for defining a relationship between three dimensional feature measurements and a focus of a photolithographic exposure tool which includes a means for deriving an equation which characterizes edge width versus focus data for a default exposure level.

Claims 30-32 would be allowable over the prior art if rewritten as described above because the prior art does not disclose or suggest computer readable program code for inputting to a function, which defines a relationship between three dimensional feature measurements and a focus of a photolithographic exposure tool, an average of measurements made on a specific three dimensional feature type across an exposure field on a production wafer to derive a measured focus of the specific three dimensional feature type on the production wafer.

11. The following references are cited as being art of general interest: Archie et al. which disclose critical dimension and tool resolution determination using edge width, "Sidewall angle measurements using CD SEM" (Su et al.) which disclose the use of CD SEM to measure feature edge widths in wafers, Govil et al. which disclose the use of focus offset coefficients, Hasegawa et al. which disclose edge profiles by best focus and Mieher et al. which disclose determining lithographic focus and exposure.

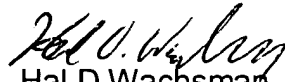
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hal D Wachsman whose telephone number is 703-305-9788. The examiner can normally be reached on Monday to Friday 7:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc Hoff can be reached on 703-308-1677. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Hal D Wachsmann
Primary Examiner
Art Unit 2857

HW
November 10, 2003